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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/905,157	07/12/2001	Nathan S. Lewis	1034345-000200	2732

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EXAMINER	
RODGERS, COLLEEN E	
ART UNIT	**PAPER NUMBER**
2813	

NOTIFICATION DATE	DELIVERY MODE
01/02/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	09/905,157	LEWIS ET AL.	
	Examiner	Art Unit	
	Colleen E. Rodgers	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-8,13,16-27,31-40 and 44-57* is/are pending in the application.

4a) Of the above claim(s) *6-8,18-20 and 31-40* is/are withdrawn from consideration.

5)☒ Claim(s) *13,16,17,21-27 and 49-53* is/are allowed.

6)☒ Claim(s) *1,4,5,44-48 and 54* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 26 October 2007 has been entered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claim 54 is rejected under 35 U.S.C. 102(b) as being anticipated by **Linford et al** (USPN 5,429,708).

Regarding claim 54, **Linford et al** disclose a semiconductor substrate comprising:

a monocrystalline silicon-containing material **12** having a surface **40** substantially free of oxidation [see col. 1, lines 17-21; Figs. 2A, 2B, 3, etc; and col. 2, lines 6-45]; and

an organic layer **44, 45, 46** having more than half of its atoms being carbon and hydrogen [as R is, *inter alia*, alkyl, alkenyls, aryl, cycloalkyl, which consist of hydrogen and carbon; see col. 5, lines 5-13], wherein the organic layer is chemically bonded to the surface **10, 30, 32. 38** of the silicon-containing material [see col. 2, lines 6-45], wherein an electrical property is selected from surface

recombination velocity, carrier lifetime, electronic efficiency, voltage, device capacitance, contact resistance, and resistance of a doped region of the semiconductor substrate is changed as compared to the electrical property of the substrate in the absence of the organic layer [see col. 1, lines 21-31; see also the paragraph bridging cols. 8 and 9; see all figures].

For example, **Linford et al** state in the paragraph bridging cols. 8 and 9:

> For example, such molecular layers are suitable for use with: silicon based, micromechanical devices to minimize striction; electrode surfaces to **optimize their electrochemical properties** for use in fuel cells or electrochemical synthetic cells; solar cells as an **antioxidation coating**, silicon chips as a monomolecular photoresist, and Si-based chemical sensors to **alter the chemical properties of the underlying Si** [emphasis added].

The word "optimization," by definition, is to improve, and the word "alter" is a synonym of the word "change." Accordingly, **Linford et al** expressly and inherently teach both changing and improving the electrical properties of the semiconductor substrate. It is seen to be inherent that the organic layer of **Linford et al** changes the electrical properties of the silicon-containing material, wherein the electrical properties are selected from surface recombination velocity, carrier lifetime, electronic efficiency, voltage, device capacitance, contact resistance, and resistance of a doped region of the semiconductor substrate. Evidence is the admission of Applicant in the instant specification (for example at page 7, paragraph 0031 and paragraph 0056, bridging pages 15 and 16). See *In re Swinehart*, 169 USPQ 226, 229 (CCPA 1971) (where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that subject matter shown to be in the prior art does not possess the characteristics relied on) and *In re Fitzgerald*, 205 USPQ 594 (CCPA 1980) (the burden of proof can be shifted to the applicant to show that subject matter of the prior art does not possess the

characteristic relied on whether the rejection is based on inherency under 35 U.S.C. 102 or obviousness under 35 U.S.C. 103). Note that as long as there is evidence of record establishing inherency, failure of those skilled in the art to contemporaneously recognize an inherent property, function or ingredient of a prior art reference does not preclude a finding of anticipation. See *Atlas Powder Co. v. IRECO, Inc.*, 190 F.3d 1342, 1349, 51 USPQ2d 1943, 1948 (Fed. Cir. 1999) (Two prior art references disclosed blasting compositions containing water-in-oil emulsions with identical ingredients to those claimed, in overlapping ranges with the claimed composition. The only element of the claims arguably not present in the prior art compositions was "sufficient aeration ... entrapped to enhance sensitivity to a substantial degree." The Federal Circuit found that the emulsions described in both references would inevitably and inherently have "sufficient aeration" to sensitize the compound in the claimed ranges based on the evidence of record (including test data and expert testimony). This finding of inherency was not defeated by the fact that one of the references taught away from air entrapment or purposeful aeration.). See also *In re King*, 801 F.2d 1324, 1327, 231 USPQ 136, 139 (Fed. Cir. 1986); *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 782, 227 USPQ 773, 778 (Fed. Cir. 1985).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 4, 5, and 44-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Stengl et al** (USPN 5,360,759) in view of **Linford et al** (USPN 5,429,708).

Regarding claim 1, **Stengl et al** teach a semiconductor substrate comprising:

a region of monocrystalline porous silicon-containing material having a porosity of not more than 30% [region **36** in Fig. 4 was epitaxially grown on single-crystal silicon and is therefore itself monocrystalline, and subsequently anodically etched to become porous; see col. 4, line 47 and col. 5, line 45]; and

an organic layer immediately adjacent to the region of monocrystalline porous silicon-containing material [photoresist mask not shown in Fig. 4; see col. 5, lines 28-30].

Stengl et al do not specify that the silicon-containing material is substantially free of oxidation, or wherein the organic layer has more than half of its atoms being carbon and hydrogen, wherein the organic layer is chemically bonded to the surface of the silicon-containing material, wherein an electrical property is selected from surface recombination velocity, carrier lifetime, electronic efficiency, voltage, device capacitance, contact resistance, and resistance of a doped region of the semiconductor substrate is changed as compared to the electrical property of the substrate in the absence of the organic layer, and wherein as a result of said organic layer being chemically bonded to the surface of the silicon-containing material, said surface comprises a measurable carrier lifetime for low-level injection of more than approximately 7.8 μs or for high-level injection of more than approximately 12 μs, or a measurable surface recombination velocity of less than approximately 1300 cm/s for low-level injection or less than approximately 810 cm/s for high-level injection.

Linford et al disclose a semiconductor substrate comprising a monocrystalline silicon-containing material **12** having a surface **40** substantially free of oxidation [see col. 1, lines 17-21; Figs. 2A, 2B, 3, etc; and col. 2, lines 6-45] and an organic layer **44, 45, 46** having more than half of its

atoms being carbon and hydrogen [as R is, *inter alia*, alkyl, alkenyls, aryl, cycloalkyl, which consist of hydrogen and carbon; see col. 5, lines 5-13], wherein the organic layer is chemically bonded to the surface **10, 30, 32. 38** of the silicon-containing material [see col. 2, lines 6-45], wherein an electrical property is selected from surface recombination velocity, carrier lifetime, electronic efficiency, voltage, device capacitance, contact resistance, and resistance of a doped region of the semiconductor substrate is changed as compared to the electrical property of the substrate in the absence of the organic layer [see col. 1, lines 21-31; see also the paragraph bridging cols. 8 and 9; see all figures]. See rejection of claim 54 above for complete argument regarding inherency.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use the organic monolayer (and the method of applying it, including the removal of any oxidized layer) as taught by **Linford et al** as the photoresist on the substrate of **Stengl et al** because the organic layer of **Linford et al** provides a substantial chemical and mechanical barrier [see **Linford et al**, col. 8, lines 56-63].

Regarding claims 4 and 5, **Linford et al** teach that the organic layer comprises a hydrocarbon and a polymer [see Table 1 and claim 32 of **Linford et al**].

Regarding claims 44-47, **Linford et al** teach a methylated surface, an ethylated surface (alkyl with 2 carbons and 5 hydrogens) and a hexylated surface (alkyl with 6 carbons and 13 hydrogens) [see col. 5, line 7 and col. 8, lines 9-15].

Regarding claim 48, **Linford et al** teach an alkoxylated surface [see col. 4, lines 44-49 and Fig. 5].

Allowable Subject Matter

6. Claims 13, 16, 17, 21-27 and 49-53 are allowed.

7. The following is an examiner's statement of reasons for allowance: the prior art of record fails to teach or make reasonably obvious wherein the organic layer is formed in the presence of an alcohol-ferrocene solution.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

8. Applicant's arguments filed 26 October 2007 have been fully considered but they are not persuasive. Regarding the rejection of claims 1, 4, 5 and 44-48, Applicants merely argue that contacting a silicon substrate with an organic layer does not result in the claimed characteristics. This does not constitute a substantive argument, and the rejection stands.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colleen E. Rodgers whose telephone number is (571) 272-8603. The examiner can normally be reached on Monday through Friday, 9:00 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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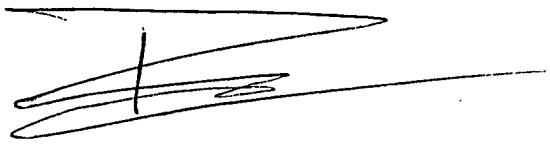

THAO X. LE
PRIMARY PATENT EXAMINER